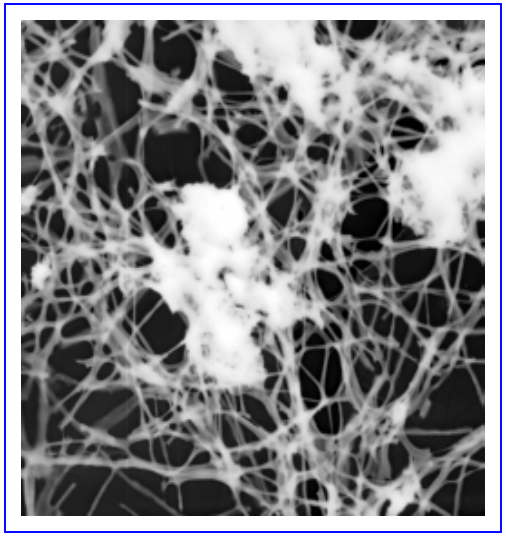
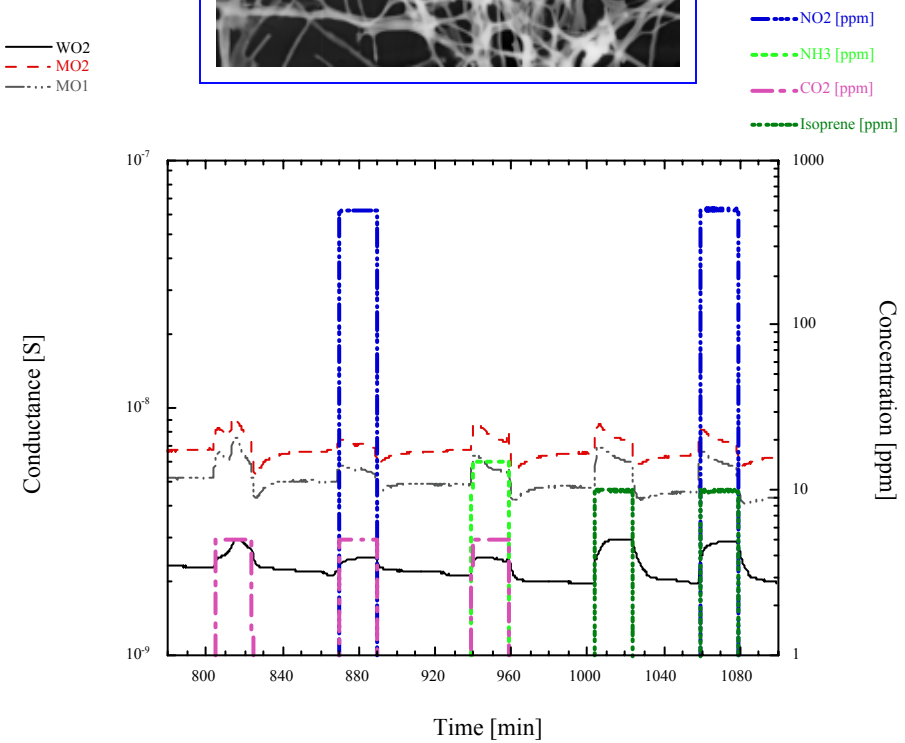
NIRT: Nano-Composite Metal Oxides for Electronic Noses

Perena Gouma, SUNY-Stony Brook, DMR-0304169

We have used a novel nanofabrication technique for the synthesis of composite fiber structures, that is electrospinning. Using mixtures of oxide sol-gel (e.g. WO_3) and polymer solutions (such as PEO) non-woven mats of composite nanofibers were obtained, as shown in the low magnification scanning electron micrograph to the right. The diameter of the as-received fibers varied between a few nm and a few hundred nm, therefore further process optimization is required to control the fiber size distribution.



At the same time, arrays of metal oxide sensors have been tested for gases such as isoprene, CO_2, NO_2, ammonia, etc. We are interested in developing novel gas detection systems for the non-invasive diagnosis of metabolites that "signal" physiological anomalies in humans. Isoprene detection in human breath may be used to monitor blood cholesterol level, for example. The plot to the right shows the response of a 3-sensor array to the presence of different concentrations of three potential interfering species as compared to that for isoprene.



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Broader Impacts

The PI participated at the multidisciplinary conference on Nanomaterials and Nanotechnologies (NN2003) and presented the early research findings of this NIRT project in a talk given at the US-NSF Workshop held during the conference. New scientific contacts were made during this forum with researchers from Eastern Europe and South America and opportunities for collaboration with these international partners are currently being explored.

Furthermore, a new interdisciplinary undergraduate course on Sensor Materials and Devices (ESG 320 has been developed by the PI and is being taught as part of the curriculum of the engineering science program of the Materials Science and Engineering department. It refers to the synthesis and properties of nanostructured materials and of micro-/nanofabricated sensing devices. Experts from industry are invited to talk to the class about their experiences in these fields of science and engineering.

International Conference **NANOMATERIALS AND NANOTECHNOLOGIES (NN 2003),**
Crete, Greece; August 30 - September 6, 2003

Conference chair: ŹŹŹA.Ovid'ko (Russian Academy of Sciences)

Objective:
The objective of this Conference is to highlight current and future **multidisciplinary research** on nanostructured materials and development of nanotechnologies with the primary focus on reinforce of connection between the fundamental science, engineering and commercialization of nanostructures; between universities, governmental laboratories, academic institutions, private research sector and industry. This Conference aims to assess the current status and to identify future priority directions of fabrication, research, design and applications of nanocomposites, carbon nanotubes, self-assembled supramolecules, nanostructured bulk solids, films and coatings, quantum dots and wires. Particular emphasis will be placed on developing close interactions among scientists and engineers from Asia, Europe, and North America and *fostering future transdisciplinary and multi-institutional collaboration* in this new and rapidly growing area.

Nano Workshop for US Scientists (US-NSF Workshop)
Organizers: I. A. Ovid'ko and S. Seal